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Up, Up and . . . Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space

Steven Freeland*

[I]n a general sense, space is the ultimate frontier—and something we at Virgin have dearly wanted to do is bring space tourism one day to the masses.¹

I. THE BEGINNING OF A NEW ERA OF SPACE ACTIVITIES

In early October 2004, *SpaceShipOne* was successfully “launched” from its mother plane *White Knight* and went on to complete its second journey within the space of a week to an altitude of more than one hundred kilometers and back. As a result, Mojave Aerospace Ventures, a company established by the vehicle’s designer Burt Rutan and financier Paul Allen, claimed the ten million dollar Ansari X Prize. More significantly, the success of the project demonstrated that the technology for short-term human suborbital flight had arrived, encouraging even more ambitious plans for space tourism. Already a new prize—the X Prize Cup—has been announced by the promoters of the Ansari X Prize, to be offered on an annual basis in recognition of further achievements in suborbital flight.

Following the success of *SpaceShipOne*, entrepreneur Richard Branson announced an agreement with its designers for the construction of a larger commercial vehicle, which will provide Virgin Atlantic passengers with a three and a half hour journey into space. There are reports that over seven thousand people have already signed on to reserve a \$275,000 seat on these flights, due to

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¹ Sir Richard Branson, Chief Executive of Virgin Galactic, quoted in *Branson Aims for the Stars*, Ninemsn Sci Tech News (June 17, 2004), available online at <<http://news.ninemsn.com.au/article.aspx?id=10147>> (visited Feb 17, 2005).

commence in 2008.² A poll conducted in May 2002 indicated that 19 percent of affluent American adults would be willing to pay one hundred thousand dollars for a fifteen minute suborbital flight, while 7 percent would be prepared to pay twenty million dollars for a two-week flight to an orbital space station, with that figure rising to 16 percent if the price were reduced to a “mere” five million dollars.³

There can be no doubt that the prospect of commercial space tourism flights has captured widespread imagination. The public perception of commercial space travel has changed from mere fantasy to a possibility and will soon be a reality—much like the evolution of air travel. As a result, significant resources are being directed towards the continued advancement of Reusable Launch Vehicle (“RLV”) technology, a vital element in the development of the space tourism industry.⁴ Many companies are developing the capability of providing civilian space tourist flights, particularly suborbital flights.

One commentator has gone so far as to suggest that a traffic level of five million space passengers per year by 2030 is achievable and represents only a conservative estimate of the known demand among potential tourists. His vision for an attainable model envisages a sophisticated space tourism infrastructure including over one hundred co-orbital hotels and orbital sports centres, as well as daily scheduled lunar flights to a series of lunar orbit and lunar pole hotels.⁵ Clearly, if these forecasts are accurate, then the potential of space tourism as a significant commercial use of space will have been achieved.

Of course there have already been earlier orbital tourist flights. In April 2001, American national Dennis Tito spent six days in the Russian section of the International Space Station (“ISS”), following extensive training at Russia’s Star City complex. For the first time a passenger was able to pay for the privilege of participating in a mainstream space project involving actual orbital travel, including a stay on what is currently the world’s most expensive “hotel.” The trip by Mr. Tito was only possible following the agreement of all ISS Partners, and he spent his time “photographing the Earth and listening to opera recorded

² Eddie Fitzmaurice, *Beam Me Up, Richard*, The Sun-Herald (Sydney) 52 (Oct 24, 2004).

³ Affluent American adults were defined for the purposes of the poll as people whose yearly income exceeds \$250,000 and/or net worth exceeds \$1 million. *Space Cowboys Ready to Pony Up*, Space Daily (May 20, 2002), available online at <<http://www.spacedaily.com/news/tourism-02i.html>> (visited Feb 17, 2005).

⁴ Charity Trelease Ryabinkin, *Let There be Flight: It's Time to Reform the Regulation of Commercial Space Travel*, 69 J Air L & Comm 101, 103 (2004).

⁵ Patrick Collins, *Towards Space Tourism: The Challenge for British Space Policy*, 55:5/6 J Brit Interplanetary Soc 148, 148–49 (2002).

on compact discs.”⁶ The participation of Tito had originally been opposed by the National Aeronautics and Space Administration (“NASA”), which argued that the presence of an “amateur” on the ISS would endanger the permanent crew. However, following the success of his journey, NASA became more open to the idea of space tourists within the context of the ISS project.⁷

In April 2002, the aptly named South African, Mark Shuttleworth, became the world’s second space tourist. Like Tito, he was launched onto the ISS by the Russian Space Agency. This “Afronaut” spent eight days on the ISS conducting scientific experiments, including a number relating to the HIV virus. The symbolic relevance of his work—South Africa is one of the countries worst affected by the HIV/AIDS epidemic—provided an additional “credibility boost” to the orbital space tourist phenomenon. South African president Thabo Mbeki described Shuttleworth as “a courageous pioneer for South Africa and his continent, Africa.”⁸ These two wealthy entrepreneurs, who each reportedly paid up to twenty million dollars to engage in the ultimate tourist adventure, along with those responsible for the success of *SpaceShipOne*, have made it almost inevitable that commercial space tourism will emerge as a realistic and foreseeable use of outer space within the near future.

The prospects for both suborbital and orbital space tourism do, however, give rise to some interesting and conceptually difficult legal questions. This article sets out to examine some of the more pressing issues that must be addressed in order to allow for the appropriate regulation of space tourism activities. Legal questions involving liability, the development of property rights, and the legal status of tourists are just some of the myriad issues that require careful thought. These questions are all the more complex given the limitations of the legal regime that has already been established for Outer Space and its categorisation as a *res communis* “common asset”—part of the “Common Heritage of Mankind”⁹—which also raises broader ethical questions about space tourism activities.

⁶ United Nations, Office for Outer Space Affairs, *Highlights in Space 2001*, 24, UN Doc ST/SPACE/8 (2002).

⁷ In September 2001, NASA released its new policy on commercialisation of its manned space activities. This envisaged the opening up of space shuttle flight opportunities, and possibly also crew slots on the ISS, to private-sector personnel. *Id.* at 25.

⁸ *South Africans Celebrate First ‘Afronaut’ Launch*, SpaceDaily (Apr 25, 2002), available online at <<http://www.spacedaily.com/2002/020425153204.s76lp8qk.html>> (visited Feb 17, 2005).

⁹ This concept was first developed in the discussions leading to the United Nations Convention on the Law of the Sea (1982), 1833 UN Treaty Ser 3 (1984) (hereinafter UNCLOS). Article 136 of UNCLOS declares that “[t]he Area [i.e. the sea-bed and ocean floor and subsoil thereof beyond the limits of national jurisdiction] and its resources are the common heritage of mankind.” Article 11 of the Agreement Governing the Activities of States on the Moon and other Celestial Bodies,

II. A BRIEF DESCRIPTION OF THE SOURCES OF THE INTERNATIONAL LAW OF OUTER SPACE

To understand the specific areas of legal uncertainty that space tourism activities may give rise to, it is necessary to first review the existing framework of the international law of outer space.

The law of outer space has developed as a discrete body of law within international law. Since the launch of Sputnik 1 by the USSR in October 1957, this process of evolution has been remarkably rapid, largely driven by the realization of the international community of the need to agree on rules to regulate activities in this new "frontier." There is now a substantial body of international and domestic law principles dealing with many—but not all—aspects of the use and exploration of outer space. The principles are mainly contained in multilateral treaties, United Nations General Assembly Resolutions, a wide range of national legislation, decisions by national courts, bilateral arrangements, and determinations by Intergovernmental Organisations.

There are five main multilateral treaties that have been finalised through the auspices of the United Nations Committee on the Peaceful Uses of Outer Space ("UNCOPUOS"), the principal international body involved in the development of international space law.¹⁰ These are: (i) Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies ("Outer Space Treaty");¹¹ (ii) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space ("Rescue Agreement");¹² (iii) Convention on International Liability for Damage Caused by Space Objects ("Liability Convention");¹³ (iv) Convention on Registration of Objects Launched into Outer Space ("Registration Agreement");¹⁴ and (v) Agreement Governing the Activities of States on the Moon and other Celestial Bodies ("Moon Agreement").¹⁵ These five treaties deal with various issues relating to outer space. However, virtually all of them were formulated in the "Cold War" era when only a relatively small number of countries had space-faring capability. It is

1363 UN Treaty Ser 3 (1979) (hereinafter Moon Agreement), declares that "[t]he moon and its natural resources are the common heritage of mankind."

¹⁰ UNCOPUOS was established by the United Nations General Assembly shortly after the advent of the "space age" brought on by the successful launch of Sputnik 1.

¹¹ 18 UST 2410 (1967) (hereinafter Outer Space Treaty).

¹² 672 UN Treaty Ser 119 (1968) (hereinafter Rescue Agreement).

¹³ 24 UST 2389 (1972) (hereinafter Liability Convention).

¹⁴ 28 UST 695 (1975) (hereinafter Registration Agreement).

¹⁵ Moon Agreement (cited in note 9).

clear from the terms of these treaties that, at the time they were finalised, it had not been anticipated that humankind would engage in commercial space tourism activities and, as a result, they do not deal in any specific manner with such activities. This article will, however, discuss the general principles contained in these treaties that may impact space tourism activities.

History has demonstrated that as technology has evolved and states have increasingly recognized the potential of outer space, the range of activities planned for outer space has proliferated. In addition, the commercial prospects offered by outer space have led to significant participation by private enterprises. As these activities have emerged, the international community has adopted further regulatory procedures, largely on an ad hoc and reactive basis. These are mainly found in five sets of Principles adopted by the United Nations General Assembly.¹⁶ By definition, resolutions of the General Assembly are nonbinding and these Principles have largely been considered as constituting “soft law,” although a number of their provisions may now represent customary international law.¹⁷ Once again, however, these Principles are generally of little direct import with respect to space tourism activities.

As a consequence, despite providing a framework of fundamental principles and some very important specific guidelines, the existing international legal regime has not kept pace with much of the remarkable technological and commercial progress of space activities since 1957. This represents a major challenge, and all the more so in view of the strategic, military, and commercial potential of outer space. In the specific area of space tourism, the absence of clear international legal principles is a concern. The reality of a permanently occupied space station and the prospect of human settlements on celestial bodies raise new and unresolved questions, as does the imminent advent of large-scale private space tourism and space transportation activities.

¹⁶ These are: (i) Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, General Assembly Res No 1962, UN Doc No A/RES/1962 (1963); (ii) Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, General Assembly Res No 37/92, UN Doc No A/RES/37/92 (1982); (iii) Principles Relating to Remote Sensing of the Earth from Outer Space, General Assembly Res No 41/65, UN Doc No A/RES/41/65 (1986); (iv) Principles Relevant to the Use of Nuclear Power Sources in Outer Space, General Assembly Res No 47/68, UN Doc No A/RES/47/68 (1992); and (v) Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, General Assembly Res No 51/122, UN Doc No A/RES/51/122 (1996).

¹⁷ See Ricky J. Lee and Steven Freeland, *The Crystallisation of General Assembly Space Declarations into Customary International Law*, 46 Proceedings of the Colloquium on the Law of Outer Space 122 (2004).

In the end, what is required is the development of laws at the international level—supplemented by laws at the national level—to meet these issues. Without a uniform set of widely accepted international rules, the development of space tourism activities will be restricted by uncertainty. However, in order to facilitate the emergence of a viable commercial space tourism industry, the principles will need to strike an appropriate balance between providing certainty and sufficient minimum standards on the one hand, and protection and encouragement of innovation on the other.¹⁸ Before considering this issue further, this Article will raise a number of significant areas requiring legal clarification.

III. WHAT IS “SPACE TOURISM” AND DOES SPACE LAW APPLY?

The term “space tourism” has been defined as “any commercial activity offering customers direct or indirect experience with space travel”¹⁹ and a space tourist as “someone who tours or travels into, to, or through space or to a celestial body for pleasure and/or recreation.”²⁰ These definitions, though acceptable for the purposes of discussion, immediately give rise to the fundamental question: What is space? It may come as a surprise to most people to discover that, from a strictly legal perspective, there is as yet no clear definition of outer space—or put another way—it is unclear where (and how) air space ends and outer space begins. While outer space activities have continued to develop without significant restrictions notwithstanding this uncertainty, there are important practical reasons why a clear legal distinction between “commercial aviation flights” and “commercial space flights”²¹ should now be properly determined, given the impending advent of space tourist activities—particularly involving suborbital flights. This is even more appropriate as the fundamental premises upon which air law and outer space law are respectively based are wholly divergent.

¹⁸ For a discussion on the merits of government protection of emerging space industries (in this case the private launch industry in the United States), see Tanja L. Masson-Zwaan, *The Martin Marietta Case: Or How to Safeguard Commercial Space Activities*, 18:1 Air & Space L 16 (1993).

¹⁹ Stephan Hobe and Jürgen Cloppenburg, *Towards a New Aerospace Convention?—Selected Legal Issues of “Space Tourism”* (unpublished paper presented at 47th Colloquium of the International Institute of Space Law, Vancouver, 2004) (on file with author).

²⁰ Zeldine Niamh O’Brien, *Liability for Injury, Loss or Damage to the Space Tourist* (unpublished paper presented at 47th Colloquium of the International Institute of Space Law, Vancouver, 2004) (on file with author).

²¹ R. Thomas Rankin, Note, *Space Tourism: Pack, Ugly T-Shirts, and the Law in Outer Space*, 36 Suffolk U L Rev 695, 697 (2003).

The international law of outer space does not allow for claims of sovereignty. The Outer Space Treaty provides that “[o]uter space . . . is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”²²

This also reflects a customary law principle evidenced by the practice of States as early as the launch of Sputnik 1. As Judge Manfred Lachs of the International Court of Justice observed:

The first instruments that men sent into outer space traversed the air space of States and circled above them in outer space, yet the launching States sought no permission nor did the other States protest. This is how the freedom of movement into outer space, and in it, came to be established and recognised as law within a remarkably short period of time.²³

In essence, outer space is “free” for use—tourist activities that take place in outer space are not subject to prior consent on the part of any sovereign State. Of course, any space tourist activities requiring a launch from earth (or an air launch such as with *SpaceShipOne*) and a return to earth will also involve a “use” of air space. In this respect, the law of air space may be relevant to the legal position.

By the time Sputnik 1 had begun its orbit of earth, there was in place a well-established body of international law dealing with commercial air travel. These principles are primarily reflected in the terms of a number of widely accepted multilateral treaties, the most important of which include the Convention for the Unification of Certain Rules Relating to International Carriage by Air (“Warsaw Convention”)²⁴—which deals with the liability of air carriers—and the Convention on International Civil Aviation (“Chicago Convention”)²⁵—which sets out the legal categorisation of air space.

While it is beyond the scope of this Article to describe the fundamentals of the international law of air space,²⁶ it is important to note that, in contrast to the international law of outer space, it is based on the legal assumption that, to a large degree, air space constitutes the “territory” of the underlying state. Indeed, mirroring the terms of the first multilateral convention dealing with the standardization of a legal framework for commercial air transport—the

²² Outer Space Treaty, art II (cited in note 11).

²³ *North Sea Continental Shelf Cases (Germany v Denmark; Germany v Netherlands)*, 1969 ICJ 3, 230 (Feb 20, 1969) (separate opinion of Judge Lachs).

²⁴ 49 Stat 3000 (1929) (hereinafter Warsaw Convention). The Warsaw Convention rules were modified by the Convention for the Unification of Certain Rules for International Carriage by Air, S Treaty Doc No 106-45 (1999) (hereinafter Montreal Convention).

²⁵ 59 Stat 1693 (1947) (hereinafter Chicago Convention).

²⁶ For a detailed outline of the law of air space, see generally I.H. Ph. Diederiks-Verschoor, *An Introduction to Air Law* (Kluwer Law 7th ed 2001).

International Convention relative to Air Navigation (“Paris Convention”)²⁷—the Chicago Convention provides that “every State has complete and exclusive sovereignty over the airspace above its territory.”²⁸

This is also reflected in customary international law.²⁹ As a consequence, civil and commercial aircraft only have certain limited rights to enter the air space of another state.³⁰ Given the distinction in fundamental legal principles between air law and the international law of outer space—which will naturally have implications for issues such as jurisdiction and liability as applied to space tourism activities (discussed below)—it is important to determine *what laws apply where*. As mentioned above, the legal demarcation between air space and outer space has not been determined. There has, over the years, been some controversy in relation to how far air space extends above the surface of the earth³¹ and many suggested methodologies have been proffered to resolve this uncertainty. None of these has been accepted as a legal definition by the international community through the UNCOPUOS process—partially in response to the advancing technology in relation to conventional aircraft, but also due to an apprehension that to agree to such a demarcation may formalise the surrendering of “future valuable sovereign rights.”³² There has, however, recently been an interesting development in the context of Australian domestic space legislation that may herald the move towards a more widely recognised demarcation point.³³

²⁷ 11 LNTS 173 (1919) (hereinafter Paris Convention). Article 1 of the Paris Convention provides that “[t]he High Contracting Parties recognise that every Power has complete and exclusive sovereignty over the air space above its territory.”

²⁸ Chicago Convention, art 1 (cited in note 25).

²⁹ In *Case Concerning Military and Paramilitary Activities in and against Nicaragua (Nicaragua v US)* (merits) the International Court of Justice noted that “[t]he principle of respect for territorial sovereignty is also directly infringed by the unauthorised overflight of a state’s territory by aircraft belonging to or under the control of the government of another state.” 1986 ICJ 14, 128 (1986).

³⁰ See Chicago Convention, arts 5 and 6 (cited in note 25).

³¹ On 3 December 1976, eight equatorial States—Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Congo—signed the Bogotá Declaration (reprinted in English in 6:2 J Space L 193 (1978)), which asserted that, in the absence of any legally determined upper limit to air space, those segments of the geostationary orbit (located approximately thirty-six thousand metres directly above the equator) above their territory constituted part of their respective sovereign territories. This assertion has not been accepted by other states and is not considered to properly reflect international law.

³² Malcolm N. Shaw, *International Law* 480 (Cambridge 5th ed 2003). For a discussion of the various theories regarding a demarcation between air space and outer space, see I.H. Ph. Diederiks-Verschoor, *An Introduction to Space Law* 17–21 (Kluwer Law 2d ed 1999).

³³ The Australian Space Activities Act 1998 (Cth) (No 123 of 1998), as amended by the Space Activities Amendment Act 2002 (Cth) (No 100 of 2002), incorporates into the definition of a “launch,” a “launch vehicle,” a “return,” and a “space object” for the purposes of the legislation a

In the absence of an accepted demarcation, what laws should apply to space tourism? Should air law apply for part of the journey and space law then be applied at some (undefined) point in the overall space tourism activity? In relation to a launch of a space tourism vehicle from earth, this would be an unsatisfactory and impractical solution and actually lead to greater uncertainty in the absence of a clear defining point for the “boundary” between air space and outer space. A comprehensive and uniform legal regime that specifically envisages the complete launch and return journey of private individuals should be preferred. This is the ideal result but the finalisation of such legal regulation will require considerable time.

In the interim, the most appropriate approach seems to be the application of space law (with appropriate amendment and clarification) to the entire journey on the basis of the proposed function of the spacecraft carrying tourists—that is, the intention that it involves flight in outer space.³⁴ The alternate “exclusive” approach—to apply air law to the entire space tourism activity—appears unworkable given the lack of sovereignty that exists in outer space.

This methodology of regulating space tourism is, however, complicated by “hybrid” circumstances like the *SpaceshipOne* example, where there is a launch of a space vehicle from another vehicle in air space. The most appropriate way of regulating such flights under existing legal principles would be to apply air law to the “combined” vehicle (that is before the launch) and then apply space law to *SpaceShipOne* from the moment it is launched until its return to earth. *White Knight*, of course, would always remain subject to the law of air space. Even this solution, though pragmatic, is somewhat unsatisfactory in that, in the event of an accident during the flight, it will depend on when the accident occurs as to the relevant legal regime that is to apply. The legal position of the victim will depend on “fortuitous” circumstances. This further points to the need for a comprehensive set of rules—based on existing space law principles—to cover all space tourism activities.

Having concluded that the international law of outer space—with appropriate amendments—should be applied to space tourism activities, it is

reference to “the distance of 100 [kilometres] above mean sea level.” This is, as far as this author is aware, the first example of domestic law that refers to a specific “demarcation point” for the purposes of applying space-related regulation and, should it eventually be extensively adopted and followed elsewhere, may represent evidence tending towards the eventual creation of a new customary international rule in the future. For a discussion of the Australian legislation and its relationship to Australia’s current space engagement policy see Steven Freeland, *When Laws are not Enough—The Stalled Development of an Australian Space Launch Industry*, 8 U Western Sydney L Rev 79 (2004).

³⁴ See Bin Cheng, *International Responsibility and Liability for Launch Activities*, 20:6 Air & Space L 297, 299 (1995).

necessary to examine how such activities would be dealt with under the existing legal principles.

IV. THE LEGAL STATUS OF SPACE TOURISTS

There is, as observed above, no reference to space “tourists” in the five multilateral space treaties specifically relating to outer space. Nor was the issue directly in the minds of the United Nations General Assembly when it adopted many of those resolutions that deal with space activities.³⁵ The existing corpus of international space law does, however, contemplate space travel by “astronauts” and “personnel of a spacecraft.” The Outer Space Treaty does not provide a definition of an astronaut but stipulates that they are to be regarded as “envoys of mankind.” States are required to render “all possible assistance” to astronauts in the event of an “accident, distress or emergency landing.”³⁶ These obligations are further developed in the Rescue Agreement which, despite the use of the term “astronauts” in its full title and preamble, refers in the substantive provisions of the treaty to obligations of states to rescue and return “personnel of a spacecraft.”³⁷ Moreover, the Moon Agreement confirms that “any person” on the moon is to be regarded—at least by parties to that treaty—as an astronaut.³⁸

Given the particular status accorded to an astronaut—an envoy of mankind—it is unclear whether a commercial space tourist would fall within this classification. It is, however, probable that space tourists would constitute “personnel of a spacecraft,” thus bringing them within the rescue and return obligations of the Rescue Agreement. Indeed, if this were not the case, then those obligations would only extend to some of those onboard a space tourism flight—for example the crew—but not the paying passengers. Given that the Rescue Agreement is “prompted by sentiments of humanity,”³⁹ it should be interpreted as applying to all persons involved in a space tourism flight.

Yet, this is an issue that should be clarified. Specific reference should be made to the various types of people who are engaged in space travel. As an

³⁵ See note 16.

³⁶ Outer Space Treaty, art V (cited in note 11).

³⁷ Rescue Agreement, arts 1–4 (cited in note 12).

³⁸ Moon Agreement, art 10 (cited in note 9). The Moon Agreement has not been widely accepted by states and, as at the time of writing this article, had only been ratified by eleven states, none of which included any of the major space-faring States. For a discussion of the history leading to the development of the Moon Agreement and the differing views of the treaty by developed and developing countries, see generally Brian M. Hoffstadt, *Moving the Heavens: Lunar Mining and the “Common Heritage of Mankind” in the Moon Treaty*, 42 UCLA L Rev 575 (1994).

³⁹ Rescue Agreement, preamble (cited in note 12).

example, in early 2002, the participating Space Agencies in the ISS project reached an agreement as to who was allowed on the ISS. This covered both “professional astronauts/cosmonauts” and “spaceflight participants,” which included those on “commercial, scientific and other programmes, crewmembers of non-partner space agencies, engineers, scientists, teachers, journalists, filmmakers, or tourists.”⁴⁰ The agreement has not gone so far as to require these participants to sign a Code of Conduct—as is required for crew members of the ISS—but the inclusion of nonprofessional persons such as tourists on board space vehicles will necessitate acceptance by them of some minimum standard of care.

Another legal issue relating to the status of a space tourist stems from the terms of the Liability Convention (discussed in more detail below). That instrument expressly does not apply to damage caused by a space object to “[f]oreign nationals *during such time as they are participating in the operation of that space object* from the time of its launching or at any stage thereafter until its descent.”⁴¹

These words are somewhat ambiguous, but it is likely that space tourists would generally not fall within this exception, since they would not normally be performing these tasks. Yet, in certain circumstances, it may fall to a consideration of the specific functions (if any) undertaken by the tourist while aboard the space object, leading to uncertainty. (For example, was Shuttleworth, by conducting his experiments, participating to any greater degree in the operation of the ISS than Tito?) This is but one of the many issues to be clarified in the development of an appropriate legal regime for liability arising from space tourism activities.

Before considering this broad liability regime, it is important to consider the fundamental question of “property rights” in outer space—a concept that appears to flow from certain space tourism activities but challenges some basic precepts of the international law of outer space.

V. THE NEED FOR CELESTIAL PROPERTY RIGHTS?

The fundamental principle of “non-appropriation” upon which the international law of outer space is based stems from the desire of the

⁴⁰ *Final Frontier Now Open—But Visa Still Required*, SpaceDaily.com (Feb 5, 2002). As this article is being written, the United States Congress and Senate have just passed the Commercial Space Launch Amendments Act of 2004, Pub L No 108-492 (2005), which provides for amendments to Commercial Space Launch Act of 1984, 49 USC § 70101 (2004), in order to permit human space flight by private corporations. The legislation distinguishes between the “crew” of a space vehicle, who in the course of his/her employment “performs activities . . . directly relating to the launch, reentry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings” and a “space flight participant.” The legislation is currently awaiting the signature of the President.

⁴¹ Liability Convention, art VII(b) (cited in note 13) (emphasis added).

international community to ensure that outer space remains an area beyond the jurisdiction of any state(s). Similar ideals emerge from UNCLOS (in relation to the High Seas) as well as the Antarctic Treaty,⁴² although in the case of the latter treaty, it was finalised after a number of claims of sovereignty had already been made by various States and therefore was structured to “postpone” rather than prejudice or renounce those previously asserted claims.⁴³

In the case of outer space, its exploitation and use is expressed in Article I of the Outer Space Treaty to be “the province of all mankind,” a term whose meaning is not entirely clear but has been interpreted by most commentators as evincing the desire to ensure that any State is free to engage in space activities without reference to any sovereign claims of other States. This freedom is reinforced by other parts of the same Article and is repeated in the Moon Agreement (which also applies to “other celestial bodies within the solar system, other than the earth”).⁴⁴

Even though both the scope for space activities and the number of private participants have expanded significantly since these treaties were finalised, it has still been suggested that the nonappropriation principle constitutes “an absolute barrier in the realization of every kind of space activity.”⁴⁵ The amount of capital expenditure required to research, scope, trial, and implement a new space activity is significant. To bring this activity to the point where it can represent a viable “stand alone” commercial venture takes many years and almost limitless funding. From the perspective of a private enterprise contemplating such an activity, it would quite obviously be an important element in its decision to devote resources to this activity that it is able to secure the highest degree of legal rights in order to protect its investment. Security of patent and other intellectual property rights, for example, are vital prerequisites for private enterprise research activity on the ISS, and these rights are specifically addressed by the ISS Agreement between the partners to the project and were applicable to the experiments undertaken by Mark Shuttleworth when he was onboard the ISS.⁴⁶

⁴² 12 UST 794 (1959).

⁴³ *Id.*, art IV.

⁴⁴ Moon Agreement, art 1 (cited in note 9). Article I of the Outer Space Treaty (cited in note 11) provides that outer space “including the moon and other celestial bodies, shall be free for exploitation and use by all States” and that there shall be “free access to all areas of celestial bodies.” Article 4(1) of the Moon Agreement provides that “[t]he exploration and use of the moon shall be the province of all mankind.”

⁴⁵ Diederiks-Verschoor, *An Introduction to Space Law* at 28 (cited in note 32).

⁴⁶ The partners in the ISS Project are the United States, Russia, Japan, Canada, and eleven Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom). Article 21 of the

In relation to space tourism activities, not only intellectual property rights (how does Richard Branson protect the rights to his “Virgin” label in outer space?), but also various other forms of tangible property rights may also become relevant. To take one example, it is quite foreseeable that as space tourism activities develop, there will emerge the demand for the constant presence of tourists on the moon and other celestial bodies, necessitating the construction of celestial hotels. Naturally, it will be important for the “owner” of such a structure to gain some legal protection in relation to the site of the hotel—perhaps akin to some form of a leasehold (or even freehold) title with which we are familiar on earth. Here the problem presents itself: In the absence of “sovereignty,” it is not possible under existing international space law to assert that any particular jurisdiction applies to the area on which the hotel is to be constructed. Without a right of any state to exercise jurisdiction—that is to make (and enforce) laws—it is impossible to determine *how* such a title can be established.

The international law of outer space has until now dealt with issues of jurisdiction through a system of registration. Under the Outer Space Treaty, “jurisdiction and control” over a space object and its personnel “while in outer space or on a celestial body” is vested in the State that registers that object pursuant to the Registration Agreement.⁴⁷ The definition of a “space object” is vague and is unlikely to include a structure such as a hotel, which is designed as a stationary (semi-) permanent construction.⁴⁸ Even if it could be interpreted to fall within the meaning of a space object, this would only solve the jurisdictional questions relating to the *inside* of the hotel but not to the surface of the moon.

The Moon Agreement does not provide an answer to this lack of a jurisdictional base upon which to assert some form of property rights over the area upon which a space tourist hotel would be constructed. In theory, there would remain under current space law a right of free access to that area, and the construction of the hotel—and presumably its location in a specific area—cannot interfere with the activities of other parties to the Moon Agreement. While the Moon Agreement does not specify the consequences of a breach of these requirements, it appears that the construction of a hotel on a celestial body raises uncertainties under current international space law principles. Indeed, the Moon Agreement expressly provides that the surface (and subsurface) of the

intergovernmental agreement that formalises the relationship between the ISS Partners, the Agreement Concerning Cooperation on the Civil International Space Station, 41 ILM 1481 (1998); specifically deals with jurisdictional issues relating to intellectual property rights on board the ISS.

⁴⁷ Outer Space Treaty, art VIII (cited in note 11).

⁴⁸ Article I(b) of the Registration Agreement (cited in note 14) provides that a space object “includes component parts of a space object as well as its launch vehicle and parts thereof.”

moon “shall [not] become property of any State, international intergovernmental or nongovernmental organization, national organization or nongovernmental entity or of any natural person.”⁴⁹

Notwithstanding this provision, the Moon Agreement, which is largely directed towards the exploitation of the natural resources of the moon, contemplates the development and removal of these resources—albeit under the management of an international regime established for that purpose. This gives rise to a notion of some form of property rights akin to a “mining license.” It is not at all clear where the legal basis of these rights would lie, apart from any specific procedures specified by the management regime itself.

There are some other instances where it is asserted that, despite the nonappropriation principle, the practice of States has been to accept the allocation of “quasi property rights” necessary for specific space activities. As an example, the International Telecommunications Union (“ITU”), in addition to regulating the radio spectrum, is responsible for the allocation of orbital “slots” in the geostationary orbit (“GEO”) to States. Indeed, following pressure from developing countries concerned that the earlier “first-come first-served” approach to the GEO would mean that they would be deprived of the opportunity to derive any benefit from this valuable and “limited natural resource,”⁵⁰ the ITU’s allotment plans were amended specifically to guarantee all states “equitable access” to the GEO.⁵¹ The notion of no sovereignty is increasingly challenged by allowing for a system where a part of outer space is allocated to a particular state to the exclusion of all other states. There have been circumstances where a state, having been allocated various orbitals in GEO, has then proceeded to rent these positions out to other states.⁵² This certainly presents the appearance of some form of property rights, based on a notion of sovereignty, over an area in outer space.

These are very difficult issues to consider and go to the core of the fundamental bases upon which the international law of outer space has been developed. The question of property rights is obviously not peculiar to space tourism activities. However, the development of these types of activities—including the possibility that they will eventually lead to the establishment of

⁴⁹ Moon Agreement, art 11(3) (cited in note 9).

⁵⁰ Constitution of the International Telecommunication Union, art 44(2) (1992) (declaring both the GEO and the space radio frequencies to be “limited natural resources”), reprinted in *Final Acts of the Additional Plenipotentiary Conference: Constitution and Convention of the International Telecommunication Union* 36 (ITU 1993).

⁵¹ See ITU Res No 18, ¶ 1(ii)(i) (1994), available online at <http://www.itu.int/publications/cchtm/dec_res_rec/res18.html> (visited Feb 17, 2005).

⁵² See Don Riddick, *Why Does Tonga Own Outer Space?*, 19:1 Air & Space L 15 (1994).

permanent settlements or “colonies” in space—highlights the need to “update” international space law in a way that will encourage the full potential of space tourism adventures that lie before humankind. This will require a clear outline of the scope of formal property rights that can be acquired by private entities seeking to promote their space tourism services.

VI. SAFETY ISSUES AND LIABILITY FOR SPACE TOURISTS AND THIRD PARTIES

The sobering memories of the February 2003 Columbia disaster illustrate the hazardous nature of space travel and demand the highest possible standards of safety regulation for future commercial human space travel. If the space tourism industry is to properly develop, every effort must be taken to ensure the safety of orbital and suborbital flights. Of course this should be the case with human space travel already; however there are enormous costs associated with addressing every foreseeable contingency that may arise. The provision of protective equipment on a space shuttle, for example, is costly and heavy and adversely impacts on payload capacity. In reality, human space travel has, to date, involved trade-offs between design and what are deemed as “acceptable” risks, given the very significant amounts of money that are involved. Yet the loss of two (of the original five) space shuttles after only 113 flights is in itself an unacceptably high failure rate for any type of activity open to the public, and even exceeds NASA’s own safety margin requirements.⁵³

Not only must there be appropriate safety standards pertaining to the design, construction, and operation of a space tourism launch vehicle, but a system of responsibility and liability must be established at the international level—supplemented by domestic law—to regulate circumstances where a space tourist suffers injury, loss, or damage, so as to remove uncertainties and ensure proper risk avoidance procedures are put into place.

In this regard, existing international space law is inadequate. Although it was contemplated that “national activities in outer space” might be undertaken by nongovernmental entities, the Outer Space Treaty provides that responsibility for such activities rests with states. Despite the fact that the range of space activities and the number and type of participants in these activities has grown exponentially, this remains the position today. States are required to authorize and continually supervise national activities in outer space undertaken by nongovernmental entities, as specified by the terms of Article VI of the Outer

⁵³ Paul Recer and Broward Liston, *More Shuttles Are Likely to Be Lost, Safety Panel Tells NASA*, Sydney Morning Herald 16 (Mar 28, 2003).

Space Treaty. These principles also reflect customary international law and thus bind all states.

Flowing on from this “state-oriented” system of responsibility, Article VII of the Outer Space Treaty, together with the more detailed liability regime specified in the Liability Convention, impose liability on a “launching State” for certain specified damage caused by a space object.⁵⁴ In the absence of specific waivers, or where the various exceptions and exonerations contained in the Liability Convention do not apply, all launching states will bear this international obligation of liability on a joint and several basis.⁵⁵ This has been one of the underlying reasons behind the growing number of national space laws enacted by space faring states, the terms of which enable them to pass on financial responsibility to, and recover from their private entities the amount of the damages for which the relevant state remains liable at the international level.

Where damage is suffered by individuals, the Liability Convention procedures only allow for legal action to be taken by a relevant state. This requires political will on the part of that State to present a claim to a launching state. To date no such claim has been made and it is not certain that a state would decide to bring such an action unless the circumstances were of such magnitude that it would be politically expedient for it to do so.

Space tourists themselves are unable to claim for compensation under the Liability Convention. While there may be scope to institute legal proceedings under national laws, there are limitations—such as sovereign immunity protections—that may represent a bar to a claim for compensation.⁵⁶ In addition, given the private contractual nature—between the operator and the tourist—by which most space tourism activities will take place, it is highly likely that carefully crafted exclusion of liability clauses for death and injury would have been included in the space tourism services agreement. Even though the domestic legislation of different states may seek to regulate the industry and provide for standards and protections, there is a danger that this will lead to a lack of uniformity, giving rise to uncertainty in this important area.

⁵⁴ Article 1(c) of the Liability Convention (cited in note 13) defines a launching state as follows: “(i) A State which launches or procures the launching of a space object; (ii) A State from whose territory or facility a space object is launched.”

⁵⁵ For a discussion of the terms of the Liability Convention, see Steven Freeland, *There's a Satellite in my Backyard!—Mir and the Convention on International Liability For Damage Caused by Space Objects*, 24 U New South Wales L J 462 (2001).

⁵⁶ In relation to the issue of sovereign immunity in United States courts in respect of claims under the Federal Tort Claims Act, 28 USC §§ 1346(b), 2671–80 (2004), see Lauren S. B. Bornemann, *This Is Ground Control to Major Tom . . . Your Wife Would Like to Sue but There's Nothing We Can Do . . . The Unlikelihood that the FTCA Waives Sovereign Immunity for Torts Committed by United States Employees in Outer Space: A Call for Preemptive Legislation*, 63 J Air L & Comm 517 (1998).

For all of these reasons, it is preferable that, operating over and above the range of any relevant domestic legislation, a uniform and comprehensive regime for passenger liability arising from space tourism activities be developed at the international level. These new rules, developed as part of the international law of outer space, should allow for direct private claims by passengers and operate from the moment of launch until the return to a final destination.

In this regard, it is necessary to determine the scope of this new liability regime to allow for effective and sufficient private remedies. A starting point would be a consideration of not only the existing space law provisions under the Liability Convention, but also the international regime established in relation to liability of civil airline companies for death or injury of passengers during commercial air travel. However, while an examination of the airline industry obviously represents a useful step, it must always be remembered that that regime was structured specifically to meet the peculiarities of that industry and, in any event, experience has shown that it would not necessarily be an ideal model to meet the unique characteristics and enormous costs associated with space tourism.⁵⁷

Nevertheless, a consideration of both legal regimes immediately gives rise to a number of fundamental philosophical questions. Should tourism activities in outer space be subject to absolute liability, as is the case for certain damage caused by a space object under the terms of the Liability Convention,⁵⁸ or should it instead operate under a liability regime based primarily upon principles of negligence as exists under the international law of air space? Similarly, should the quantum of the liability be unlimited, as is the case under the Liability Convention, or is it appropriate to prescribe upper limits of liability similar to that specified in the Warsaw Convention?⁵⁹ On the question of unlimited

⁵⁷ The imposition of limits to liability has meant that claimants are often tempted to sue aircraft manufacturers instead in an attempt to obtain a higher level of compensation. Shaw, *International Law* at 470 (cited in note 32).

⁵⁸ Article II of the Liability Convention provides that "[a] launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight." Liability Convention, art II (cited in note 13). However, if the damage is caused "elsewhere than on the surface of the earth," liability only arises where the damage is due to "fault" by those responsible for the space object causing the damage. *Id.*, art III.

⁵⁹ The Warsaw Convention, as amended, provides for upper limits for liability in relation to the carriage of passengers and of baggage and cargo as well as dealing with areas of responsibility and insurance. Article 20(1) of the instrument exonerates the carrier from liability where it or its servants and agents "have taken all necessary measures to avoid the damage or that it was impossible for him or them to take such measures." Warsaw Convention, art 20(1) (cited in note 24). The Montreal Convention was designed to supersede the Warsaw Convention and removed the system of arbitrary limits on air carrier liability by providing that the carrier was liable for the full amount of the damages unless it could demonstrate that it was not negligent or that a third

liability, there have already been calls from leading commentators for the establishment of a limited liability regime for launching States under existing space law.⁶⁰ Moreover, many will argue that space tourist passengers voluntarily accept the inherent risks associated with space travel and thus liability should be limited to balance this assumption of risk.

Whatever the final form of regime, it is clear that the existing rules of space law, which rely solely on state responsibility and liability, are not appropriate for an industry that will principally be undertaken as a private commercial venture. Moreover, this regime must address not only issues of passenger liability but also third party liability.⁶¹ A new multilateral treaty should be developed to establish a system of liability that attaches to those private operators conducting space tourism activities.

This will also require the development of an effective space tourism insurance market. The advent of commercial space tourism activities available to the public will bring with it the need for new and complex risk management assessment procedures. It will be important to ensure that the legal regime for liability for such activities, as well as the terms and conditions of any tourism services agreement between passengers and operators, are matched by the availability of appropriate insurance coverage. Careful attention is required to make sure that there are no "gaps" in the provision of such insurance.⁶²

These developments will allow the participants in the space tourism industry, and the governmental and inter-governmental agencies that are charged with regulating them, to be in a position to assess financial risks and exposure as they develop policies to create a viable and safe long-term industry.

party was solely responsible for the damage. See Montreal Convention, art VI (cited in note 24). See also Shaw, *International Law* at 471–72 (cited in note 32).

⁶⁰ See, for example, International Law Association, *Report of the Seventieth Conference* 209 (Apr 2002) (comment of Carl Q. Christol).

⁶¹ The Convention on Damage Caused by Aircraft to Third Parties on the Surface, 310 UN Treaty Ser 181 (1952), deals with issues of third party liability in respect of commercial air activities. Paragraph 1 of the preamble of this instrument provides that it is intended "to ensure adequate compensation for persons who suffer damage caused on the surface by foreign aircraft, while limiting in a reasonable manner the extent of the liabilities incurred for such damage in order not to hinder the development of international civil air transport." *Id.* preamble, ¶ 1.

⁶² For a discussion of the various factors relevant to the provision of insurance for current (non-tourism) space activities, see Richard Ritorto and Michael S. Mitchell, *Telecommunications Satellite Insurance*, 18:3 Air & Space L 136 (1993).

VII. SOME ETHICAL DIMENSIONS OF AN INTERNATIONAL LEGAL REGIME FOR SPACE TOURISM

As has been mentioned above, the development of the space tourism industry challenges basic precepts of the international law of outer space. From a practical viewpoint, it is clear that the existing legal regime must be amended and expanded to meet the requirements of this burgeoning industry. If we assume that the expansion of our universe (quite literally) through the advent of space tourism activities represents a positive, almost inevitable direction for humankind, then these legal changes must provide for appropriate incentives and protections in order to encourage the development of the industry. However, it is not only the “hard law” provisions that require reassessment. It is also necessary to consider the complex ethical questions that arise, since these are highly relevant to the direction to be taken in the future development of international space law. A number of these are briefly raised below.

A. WHAT ARE APPROPRIATE SPACE TOURISM ACTIVITIES?

The idea that humans will be permanently in outer space has already been accepted by those supporting the ISS project. Despite its travails, particularly in light of the *Columbia* disaster, the ISS represents a first example of humankind’s pioneering efforts to make the space environment “part of its domain.”⁶³ The evolution of space tourism activities will not only make space more accessible to human beings, but it will also reinforce this constant human presence in outer space. This is not of itself incompatible with an equitable Common Heritage of Mankind approach towards outer space—a common area to be shared amongst all humans of this and future generations—provided that the rules to regulate such activities also ensure that these concepts are protected.

In this regard, many questions arise, each one of which will influence the way in which the international law of outer space should regulate future space tourism activities. For example, what sorts of space tourism activities are appropriate? Should there be any restriction at all on the nature of these activities to preserve the “integrity” of humankind’s endeavours in outer space, which to date have been largely of a scientific nature? On what basis, if any, should these restrictions be determined? Would it be acceptable, for example, to allow advertising billboards to be constructed, or casinos or even brothels to be established on the moon or other celestial bodies to cater to space tourists? How do space tourism activities correlate with the underlying philosophy by which international space law has always operated—that the exploration and use of

⁶³ Mark Williamson, *Space Ethics and Protection of the Space Environment*, 19 Space Poly 47, 47 (2003).

outer space “shall be carried out for the benefit and in the interests of all countries”?⁶⁴

As the capability of space-related technology advances, these qualitative questions must also be addressed in order to prioritise those activities that most closely accord with the overall goals associated with humankind’s ongoing endeavours in space.

B. POLLUTION OF THE SPACE ENVIRONMENT

The protection of the natural environment of outer space is an important element in the Common Heritage of Mankind principle.⁶⁵ The international law of outer space makes some reference to the question of environmental protection, though these provisions are neither sufficiently detailed nor rigorous in standard when compared to UNCLOS, which provides for an express obligation to protect the marine environment and facilitates this in relation to the High Seas by providing for port-state jurisdiction over pollution offences.⁶⁶ Indeed, the main provision concerning environmental protection in the Outer Space Treaty (Article IX) is ill defined and imposes only minimal obligations on States. In addition, there is no legal concept of “space debris” under international space law and thus no mechanisms to regulate it. Even though the issue of the protection of the space environment is an extremely pressing concern—even without a consideration of space tourism—relatively little has been done in a substantive manner to tighten the legal requirements due to the very significant costs associated with the integration of “clean” space technology.

Space tourism activities will inevitably result in greater pressures on the space environment. They will lead to the pollution of previously pristine areas. In contrast, however, to the imposition of rules relating to space debris, the control of human activities like littering would cost relatively little in dollar terms to regulate. It is imperative that this be done in order to minimise as much as possible any additional disruption to the space environment.

Moreover, as the level of space tourism activities becomes more sophisticated, it will be necessary to construct infrastructure—hotels, dams, storage facilities, roads, and other “conveniences”—on the moon and (eventually) other celestial bodies. As has been the case on earth, mistakes will be

⁶⁴ Outer Space Treaty, art 1 (cited in note 11).

⁶⁵ A.A. Cocca, *Settlements and Environmental Protection in the Law of Outer Space*, 44 Proceedings of the Colloquium on the Law of Outer Space 337 (2002).

⁶⁶ For a description of the international Law of the Sea in relation to the protection of the marine environment, see Patricia Birnie and Alan Boyle, *International Law & the Environment* 347–403 (Oxford 2d ed 2002).

made and there will be environmental accidents. Even though it envisages exploitation of the moon's natural resources, the Moon Agreement imposes obligations on parties to protect "the existing balance of its environment."⁶⁷ The construction of any form of space tourism infrastructure on the moon will only add to the irreversible alteration of the space environment and worryingly it is difficult to imagine what the overall effect will be. There is an unavoidable conflict between the development of space tourism activities and any environmental protection principles that form part of international space law. It will therefore be necessary to establish clear guiding principles to regulate such activities.

C. PROTECTION OF THE "HERITAGE" OF SPACE

As well as the protection of the space environment from pollution, it is also appropriate to consider the protection of important sites in outer space that are (and will be) significant in the history of human endeavours in space. Legal regulation will be required to provide for "heritage sites" and "national parks" in order to protect particular areas—such as the site of the first lunar landing by humans—from accidental or deliberate damage by space tourists.⁶⁸ The development of a "Space Heritage Treaty" would be necessary to allow for this designation, and steps should be taken to minimise actual access by tourists to these areas—once disturbed, Neil Armstrong's footprints would be gone forever.

An even more complex issue—whose heritage space is—will need to be reassessed at some stage in the future. How are we to regard those human inhabitants of future space colonies, particularly those who will be born and will live their entire lives in outer space, perhaps in a permanent settlement on the moon? What are their rights and how do they relate to those international legal rules for outer space that are developed from earth?

These are, obviously, difficult questions and will probably not arise in the near future, though they represent important elements in the overall planning of an appropriate international legal regime for human activities in outer space, including space tourism. It will be important to develop comprehensive and universal ethical standards and practices to deal with the continued utilisation of space in this way. This will require that the national interest and *Realpolitik* associated with the development of binding treaties regulating the activities of the (relatively) few space faring states give way to an extension of the "global

⁶⁷ Moon Agreement, art 7 (cited in note 9).

⁶⁸ It is interesting to note that Article 7(3) of the Moon Agreement contemplates the designation of areas of the moon and other celestial bodies having "special scientific interest" as "international scientific preserves for which special protective arrangements are to be agreed upon." *Id.*, art 7(3).

approach” that has emerged in relation to terrestrial concerns that transcend the boundaries of any one State.

VIII. CONCLUSION

It has been said by one of the foremost space commentators that, in the context of meeting the new legal challenges which arise from ever expanding space activities, an essential element for effective rulemaking at the international level is a “perceived need on the part of the states concerned” to devise or change certain rules.⁶⁹ We have reached the point where the development of space tourism activities makes it appropriate to reconsider the broad fundamentals of the international law of outer space.

The corpus of space law that already exists represents an important base from which to develop the legal tools to properly regulate the next stage of space activities. Yet, quite clearly, it is not sufficient even for present purposes, let alone for the coming years and decades. The imminent advent of space tourism raises many as yet unanswered legal questions, some of which have been highlighted in this article. Other legal issues will also arise. As more space tourism (and other) activities take place, appropriate dispute resolution procedures must be agreed to deal with the inevitable conflicts that will arise, both at the public and private international law level. Detailed traffic and coordinated management systems must be developed to cope with the increased number of space flights. A clear and comprehensive legal framework must be established at the international level to reflect the wishes of the wider (global) community and to provide certainty.

At the same time, however, the broader philosophical and ethical aspects of human activities in outer space—indeed the place of human beings in the universe—demand that we continually reassess the *why* and *what* in relation to our ongoing exploration and use of outer space. It is essential that the underlying notions of cooperation and shared benefit remain as cornerstones in this next phase of human achievement.

⁶⁹ Bin Cheng, *The Commercial Development of Space: The Need for New Treaties*, 19 J Space L 17, 43 (1991).